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U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE

Forest Insect and Disease Conditions Intermountain Region 1977

COVER STORY

Second-growth ponderosa pine killed by western pine beetle, Emmett Ranger District, Boise National Forest, Idaho.

FOREST INSECT AND DISEASE CONDITIONS

INTERMOUNTAIN REGION

1977

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RESUMÉ OF CONDITIONS

Bark beetles continued to cause the greatest mortality throughout the Intermountain States in 1977. Overall, mountain pine beetle mortality continued a slow decline; however, localized infestations on the Caribou, Boise, Payette, Sawtooth, and Targhee National Forests, Idaho, showed high density tree killing. Persistent tree killing occurred on the Ashley and Wasatch National Forests, Utah, and the Bridger-Teton National Forest, Wyoming.

A general decline in Douglas-fir beetle-caused mortality was observed Regionwide; however, localized areas of tree killing were observed on the Boise, Payette, and Salmon National Forests, Idaho. Engraver beetle, western pine beetle, and mountain pine beetle working in concert caused widespread group killing of ponderosa pine on the Boise and Payette National Forests, Idaho.

Western spruce budworm infestations increased in Idaho on the Boise, Challis, and Salmon National Forests. A new infestation was recorded in Grand Teton National Park, Wyoming. Defoliation decreased slightly on the Payette National Forest, Idaho. *Ceanothus* sp., willow, and other broadleafed species were defoliated in areas of the Boise National Forest by the western tussock moth. In the Intermountain Region, primary diseases are decays, root rots, and dwarf mistletoes that take a large annual toll. Overall, the forest disease situation is little changed from 1976.

ENTOMOLOGY

Bark Beetles

Mountain pine beetle, *Dendroctonus ponderosae* Hopkins

Lodgepole Pine

As in past years the mountain pine beetle continued to be the most damaging insect in the Intermountain Region. Even though decreasing trends have been noted, several hot spots remain on various forests throughout the Intermountain Region. Lodgepole pine stands on the Targhee National Forest, which have been besieged by bark beetle activity for many years, remain the highest center of epidemic activity. In the Island Park area mortality reached as high as 35 trees per acre in 1976 and in 1977 dropped to 19 trees per acre. Many lodgepole stands in this area have lost 75 or more trees per acre during the current outbreak. Elsewhere on the Targhee only lightly scattered mortality occurred. Aerial survey data showed a slight increase in mountain pine beetle-killed trees on the Caribou National Forest from that observed in 1976.

In June 1976 on the Targhee National Forest, Idaho, a pilot study was undertaken to test the effectiveness of Sevin (carbaryl), Lindane and Dursban (chlorpyrifos) insecticides as a preventive treatment against the mountain pine beetle in lodgepole pine. The insecticides were applied as a 2% (a.i., by weight) in a water formulation. Evaluations made after the attack period of the beetle showed the following success ratios: Sevin 99% Lindane 74%, and Dursban 23%.

These data served as the basis for a pilot project in 1977. For this project, also conducted on the Targhee National Forest, tree selection, plot design, and application techniques were similar to the 1976 test. Sevin (carbaryl) was tested at 2% against the standard Lindane at its registered rate of 1.3%. The insecticides were applied to alternating blocks of 25 trees for statistical comparison. Preliminary results for the 1977 project indicate limited success for Lindane--only 45% protection. However, none of the trees treated with Sevin were successfully attacked.

During July and August 1977, the first in a series of pilot surveys was conducted on the Targhee National Forest, Idaho. These surveys are designed to measure large areas of damage caused by forest insects and diseases using aerial photography. This initial survey, covering nearly 400,000 acres, measured lodgepole pine mortality caused by the mountain pine beetle. Preliminary results indicate there are 21.4 million standing dead trees. This represents approximately 30 percent of the total stand.

Lodgepole mortality lingers in many areas on the Ashley and Wasatch National Forests, Utah, and the Bridger-Teton Forest, Wyoming. On the Ashley National Forest mortality decreased in both lodgepole and ponderosa pine in the area of Greendale Junction. A similar decrease occurred in scattered infestations in Rock Creek, Uinta River, Browne Canyon, and on the Taylor Mountain Plateau. The most extensive area of mortality on the Ashley occurs on the north slope from the western boundary of the Forest east to Deep Creek. On the Bridger-Teton Forest, losses continue on portions of Greys River, Hams Fork, Salt River, Pilgrim Creek, Black Rock, and Gros Ventre River, Big Sandy, Little Sandy, and Clear Creeks.

In 1975 approximately 20 million board feet of lodgepole were killed on the Cassia Division of the Sawtooth National Forest, Idaho, by the mountain pine beetle. In 1976 this figure dropped to approximately 4.4 million board feet and the decreasing trend continued in 1977 when 805,000 board feet of timber were killed. Of the 389 million board feet on the Cassia Division, approximately 25.5 million have been killed in the last three years. Elsewhere on the Sawtooth National Forest, mountain pine beetle activity continued at relatively high levels in the headwaters of the South Fork of the Boise River where an estimated 8,500 trees are dead.

On the Albion Division of the Sawtooth, approximately 4,000 trees have been killed. Attack centers persist along the Big Wood River and Warm Springs drainage west of Ketchum.

On the Payette National Forest two relatively large infestations continue at approximately the same levels as last year. Five thousand trees in the Paddy Flat area east of Donnelly, Idaho, and another 4,500 trees were killed in the Johnson Park area west of Council, Idaho.

For the past 17 years mountain pine beetle has been active in lodgepole stands from Payette Lake southward to Cascade Reservoir on state, federal and private lands, plus fringes of Forest Service lands. The infestation has depleted considerable lodgepole and ponderosa host type around the town of McCall, Idaho, and lodgepole type southward to Cascade. An estimated 50,000 lodgepole pine and an additional 12,000 ponderosa pine have been lost in this infestation. Scattered mortality continues along the North Fork of the Boise River and near the town of Atlanta, Idaho, on the Boise National Forest.

Ponderosa Pine

Scattered mortality in ponderosa pine was recorded on the Boise and

Payette National Forests. Heaviest concentrations occurred primarily on private lands east and northeast of Cascade, Idaho, with a small amount of activity north of Crawford Ranger Station, Boise National Forest. An estimated 2,000 trees were fading in 1977. As previously mentioned, mountain pine beetle is active in second-growth and mature ponderosa pine stands around the perimeter of Payette Lake eastward toward Little Payette Lake near McCall, Idaho. This infestation has the potential to continue at high levels due to the abundance of host type.

Douglas-fir Beetle, *Dendroctonus pseudotsugae* Hopkins

Douglas-fir beetle mortality centers were recorded on the Targhee and Caribou National Forests, Idaho. Infestation levels in these two forests have dropped off markedly since last year. The Payette National Forest, Idaho, showed the largest reduction in number of attack centers; from 226 in 1976 to 52 in 1977. Conversely, fairly high levels of activity occurred on the Boise National Forest where 648 mortality centers were recorded. These were primarily located along the South Fork of the Payette River from Lowman to Grandjean and along the South Fork of the Boise River from Anderson Ranch Reservoir to the Big Smoky area of the Sawtooth National Forest. Considerable large-group mortality was associated with areas defoliated in 1973 by the Douglas-fir tussock moth in the vicinity of Big and Little Water Creeks and Willow Creek drainages on the Sawtooth National Forest. Mortality continued on the Salmon National Forest in the vicinity of North Fork, Idaho, and along the lower reaches of Panther Creek; however, Douglas-fir beetle mortality remained static to decreasing on other areas of the Salmon Forest which had been epidemic four years ago.

Western Pine Beetle, *Dendroctonus brevicomis* (LeConte)

Western pine beetle in association with *Ips* beetle caused increased mortality of ponderosa pine on the west sides of the Boise and Payette National Forests. For the most part western pine beetle attacks are occurring in overstocked stands in the vicinity of Sagehen Reservoir on the Emmett Ranger District, Boise National Forest, and throughout ponderosa stands along the main Weiser River north of Fruitvale, Idaho, Payette National Forest. Salvage logging in 1976 to suppress populations of western pine beetle in the vicinity of Sagehen Reservoir effectively reduced further tree mortality. Relatively few new groups were observed in the area in 1977, whereas in 1976 several mortality groups exceeding 200 trees were recorded.

Spruce Beetle, *Dendroctonus rufipennis* (Kirby)

Throughout the Intermountain Region spruce beetle activity remained at low levels. Only scattered mortality was recorded in Huntington Canyon on the Manti-LaSal National Forest, Utah.

Pine Engraver Beetle, *Ips pini* (Say)

Pine engraver activity increased significantly in pine areas of the Boise and Payette National Forests (Figure 1). On the Payette Forest in 1976, 23 mortality groups were located. In 1977, 150 mortality groups were observed. Likewise, on the Boise National Forest, 29 groups were recorded in 1976; 162 were located in 1977. Approximately half of the new groups were associated with logging activities. Elsewhere, probably due to drought stress, engraver beetles caused losses in second-growth stagnated ponderosa pine. The chronic infestation in Clear Creek east of Boise continued at a fairly high level. On the Boise Ranger District, Boise National Forest, engraver beetles killed approximately 1,200 ponderosa pine, all associated with the Trail Creek Sale. *Ips* activity in Town Creek Plantation, Idaho City Ranger District, Boise National Forest, dropped to endemic levels in 1977. Precommercial thinning of Town Creek plantation spawned heavy populations and considerable tree mortality in 1976.

Figure 1. Mortality in second-growth ponderosa pine caused by engraver beetles emerging from logging slash. Emmett Ranger District, Boise National Forest.

Defoliators

Western Spruce Budworm, *Choristoneura occidentalis* Freeman

The western spruce budworm defoliated slightly less than one million acres in southwestern Idaho and western Wyoming Forests. Heaviest concentrations of defoliation were detected on the Boise and the Payette National Forests. Extensions of budworm activity on the Boise National Forest occurred in the Sagehen Reservoir and the Packer John mountain areas. The Bridger-Teton infestation in western Wyoming decreased by about half the acreage that was defoliated in 1976. A new area of infestation on Black Tail Butte in Grand Teton National Park was observed where about 500 acres of mixed Douglas-fir and true fir types are being defoliated. The largest area of increase occurred on the Salmon National Forest where in excess of 115,000 acres were recorded in 1977, a dramatic increase from the 1,300 acres reported in 1976. This is the first time since 1965 that heavy populations of the spruce budworm have been recorded on the Salmon National Forest. In 1965 unseasonal spring freezes killed larval populations of the budworm and defoliation activity has been at a low level until this year. New areas of activity on the Salmon Forest occurred north of the main Salmon River and from the confluence of Panther Creek southward into the Cobalt area. Elsewhere on the Salmon, infestations were prevalent along the Salmon portion of the Middle Fork of the Salmon River. Infestations in the Primitive area appeared to have declined somewhat with approximately 290,000 defoliated during 1977. Table 1 depicts budworm infestations in the Intermountain Region.

	DEFOLIATION INTENSITY (ACRES)			
FOREST	LIGHT	MODERATE	HEAVY	TOTAL
Boise	43,500	42,000	46,600	132,100
Bridger-Teton	30,700	21,100	800	52,600
Challis	-	28,800	-	28,800
Payette	46,500	67,600	240,000	354,100
Salmon	68,300	47,100	-	115,400
Targhee	6,400	6,200	1,200	13,800
Grand Teton National Park	-	500	-	500
Idaho Primitive Area	-	-	-	291,000 [1]
Total	195,400	213,300	288,600	988,300

Table 1. Areas of visible western spruce budworm defoliation in the Intermountain Region during 1977.

[1] Defoliation in the Idaho Primitive Area was not classified as to intensities.

Stands, on and intermingled with the Payette National Forest, show the most severe damage from defoliation by the western spruce budworm. Top-killing has occurred particularly in understory grand fir, *Abies grandis* (Dougl.) Lindl (Figure 2). Defoliation is somewhat less in areas where stands are mixed Douglas-fir, true firs. In 1977 the impact survey was expanded and results from this survey are given in a separate report. Table 2 depicts budworm activity for the past 14 years as determined by aerial surveys.

Figure 2.

Top kill of pole-sized grand fir by western spruce budworm, Donnelly Slope, Payette National Forest.

	DEFOLIATION INTENSITY (ACRES)			
YEAR	LIGHT	MEDIUM	HEAVY	TOTAL
1964	266,000	658,000	1,352,000	2,276,000
1965	465,600	254,500	795,200	1,515,300
1966	923,900	52,200	16,100	992,200
1967	162,200	54,900	1,600	218,700
1968	333,500	150,200	21,800	505,500
1969	388,800	125,400	30,200	544,400
1970	223,200	79,300	5,200	307,700
1971	229,300	110,300	34,300	373,900
1972	395,300	100,700	9,500	505,500
1973	99,700	76,400	48,000	224,100
1974	234,900	111,300	11,600	357,800
1975	568,800	130,900	33,700	733,400
1976	265,100	213,000	218,300	1,084,000 [1]
1977	195,400	213,300	288,600	988,300 [2]

Table 2. Area of visible defoliation by the western spruce budworm in the Intermountain Region during the past 14 years as determined by aerial surveys.

1 Includes an additional 387,600 acres in the Idaho Primitive Area not recorded by defoliation intensity.

2 Includes an additional 291,000 acres in the Idaho Primitive Area not recorded by defoliation intensity.

A Pilot Suppression Project was undertaken near McCall, Idaho, using the chemical Orthene ® at ½ lb. per gallon per acre. Preliminary results from that project indicate a mortality rate of approximately 91 percent (unadjusted). Registration of Orthene® for forest spray is currently being considered by the Environmental Protection Agency.

In view of the continuing impact of budworm activity on the Boise and Payette National Forests, consideration for a suppression project for 1978 is being undertaken. A Draft Environmental Impact Statement was prepared in October and November for submission to the Council on Environmental Quality. A final decision on whether or not a suppression project will be undertaken will not be made until early 1978.

Douglas-Fir Tussock Moth, *Orgyia pseudotsugata* McDunnough

Egg mass sampling in 1976 indicated zero to light defoliation for Douglas-fir tussock moth damage in Owyhee County, Idaho. This prediction held true as no visible defoliation was observed. Douglas-fir tussock moth has a long history of defoliating stands in Owyhee County, with fluctuations occurring in three- to five-year cycles. A native polyhedrosis virus has been the primary source of population declines. No new defoliation was observed east of Featherville, Idaho, Sawtooth National Forest, where in 1973-1974 Douglas-fir stands were heavily defoliated.

Sticky traps baited with an artificial sex attractant were used again in 1977 to determine distribution of Douglas-fir tussock moth in the Intermountain Region. Traps were distributed in true fir and Douglas-fir host type over 11 National Forests. Male Douglas-fir tussock moths were collected on the Challis, Salmon, Sawtooth, and Targhee National Forests in Idaho and Fishlake, Manti-LaSal, Uinta, and Wasatch National Forests in Utah. This is the first collection of Douglas-fir tussock moth from the Fishlake National Forest. In three years of trapping, 12 of the National Forests in the Intermountain Region have produced Douglas-fir tussock moths. Four Forests have shown no Douglas-fir tussock moths to date: Caribou in Idaho, Bridger-Teton in Wyoming, and Ashley and Dixie in Utah.

Larch Casebearer, *Coleophora laricella* (Hübner)

Larch casebearer was discovered infesting western larch on the Boise National Forest in 1977. Subsequently, a survey was conducted to determine the extent and intensity of the infestation and the level of parasitism in the Intermountain Region.

Results of the survey showed larch casebearer was infesting western larch throughout its range in the Intermountain Region at endemic levels. However, some of the lower elevation stands showed moderately visible defoliation from the ground. Populations of the pupal form averaged 3 per 100 needle fascicles and ranged from .03 to 12. Six native species of wasp parasites were reared from a collection of about 1,200 pupae. Parasitism of larch casebearer pupae averaged 7 percent and ranged from 0 to 11 at 10 sample locations.

Native parasites in larch casebearer infested stands of northern Idaho and western Montana have helped stabilize populations of this exotic insect somewhat and have lessened impacts to the stands. Researchers have supplemented natural control with introduction and establishment of foreign parasites. The most promising introduction has been the small Braconid wasp, *Agathis pumila* (Ratz.). This species has produced excellent control in certain localities.

Other Insects

A Ponderosa Pine Needle Miner

An infestation of needle miner in ponderosa pine was detected on the Salmon National Forest in 1977 by field workers. The annual aerial detection survey revealed four areas of discolored ponderosa foliage totalling 3,400 acres, all within the North Fork of the Salmon River drainage (Figure 3). Adults were collected and forwarded to the U.S. National Museum for identification.

Older needles were mined generally in the distal portion and to various degrees within the fascicles. The mined portions of the needles changed from

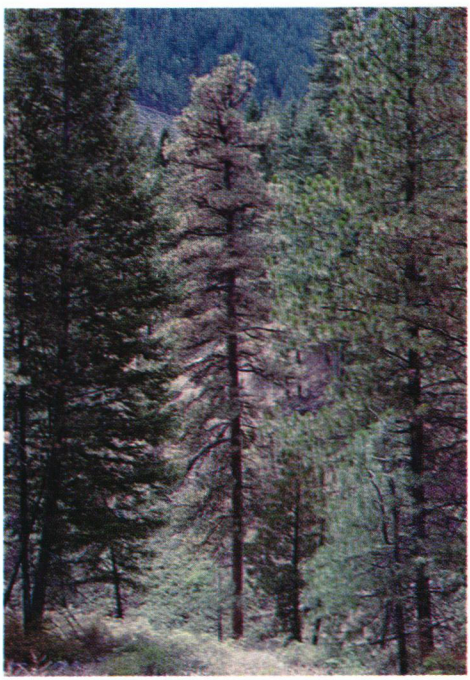

Figure 3. Needle miner injury in ponderosa pine near Gibbonsville, Idaho, Salmon National Forest.

green to yellow to brown thus giving trees their faded appearance. Severely infested trees displayed thin crowns from abscission of older needles as well as discoloration.

Ponderosa Pine Terminal Weevil, *Pissodes schwarzi* Hopkins

Sapling-sized ponderosa pine in a seed orchard near McCall, Idaho, displayed dead terminal and lateral leaders from an infestation of *P. schwarzi*. Pith was mined by weevil larvae and leader mortality of up to 18 inches resulted. The infestation occurred on less than 10 percent of the terminal leaders. Larvae, pupae, and adults were collected from infested leaders before emergence in July and forwarded to the U.S. National Museum for identification.

A Sawfly, *Neodiprion fulviceps* Cresson

Heavy defoliation is still being caused by this sawfly in a small ponderosa pine stand on the Beaver Ranger District, Fishlake National Forest. Though defoliation was observed on several hundred trees, no mortality has been detected. This infestation will be monitored over the next several years to observe population trends of the insect as well as the possibility of subsequent tree killing.

Black Pine-Leaf Scale, *Nuculaspis californicus* Coleman

Over the past several years the black pine-leaf scale has caused extensive mortality in Jeffrey pine in and around the town of Genoa, Nevada. The present infestation covers an area of approximately 300 acres, about two-thirds of which is privately owned. The remainder is on the Toiyabe National Forest. The outbreak has been attributed to aerial spraying for mosquito control, dust from unpaved roads, and a weakening of the trees from drought. The infestation appears to be subsiding due to an amelioration of the contributing factors.

PATHOLOGY

Dwarf Mistletoe, *Arceuthobium* spp.

In 1977 a survey of lodgepole pine clearcuts was conducted on part of the Targhee National Forest to determine how effective past clearcutting practices were in controlling dwarf mistletoe.

Two, 2-man crews surveyed clearcuts on the Ashton and Island Park Ranger Districts. A total of 24,648 acres of clearcuts were 100 percent sampled. All residual trees were counted. On the Ashton District 18,646 acres of clearcuts still supported 12,754 overstory trees of which 8,495 or .46 trees/acre were infected. There were 3,682 infected understory trees or .2 infected trees/acre. On the Island Park District a total of 6,002 acres was surveyed. There are 3,035 overstory trees on this acreage of which 1,202 are infected with dwarf mistletoe or .2 infected trees/acre. At this time 67 infected understory trees were found associated with the infected overstory trees.

Control of dwarf mistletoe during logging operations and followup TSI activities are the most effective methods available for reducing impacts of this pathogen to our timber resource. In order for these activities to be effective they must be carried out in a manner which insures that all culls and "whips" remaining on clearcuts be killed or removed. The assumption, based on previous survey data, is that the majority of the cull trees remaining in clearcuts following harvesting are mistletoe infected.

The practice of planting seedlings of non-susceptible tree species in areas with infected overstory trees can reduce impact, slow or stop spread of the parasite, and hasten plant succession. Conversely, planting susceptible seedlings under infected overstory trees can result in severe growth loss of the planted seedlings. Many of the lodgepole pine clearcuts surveyed were found to have been planted with lodgepole pine seedlings.

Approximately 1,000 acres of selectively logged BLM lands were also surveyed for dwarf mistletoe infected leave trees. Almost all areas were Douglas-fir forest type. There was either no or low levels of Douglas-fir dwarf mistletoe found in the areas. Stands in which Douglas-fir and lodgepole pine were in mixture generally had high levels of lodgepole pine dwarf mistletoe.

Survey of Developed Sites for Hazardous Green Trees

This year campgrounds and other developed sites on the Payette, Sawtooth, Salmon, and Toiyabe National Forests were surveyed for hazardous

green trees. All trees upon failure that would reach the picnic table-firepit-vehicle pad area or other developments were examined for root, butt and trunk rots, dead limbs, cankers, dead and multiple tops, lean, undercutting of roots, and mechanical injury (Figure 4). Trees with any of these defects were rated as low, medium, or high hazards. Many trees were found which had more than one defect. The most common causes for high hazard ratings were root, butt and trunk rots, leaners, and bole cankers. District personnel participated with Forest Insect and Disease Management personnel in the examination and hazard rating of the trees.

Figure 4. Failure of root rotted green Douglas-fir in developed site, Corn Cr. Campground, North Fork Ranger District, Salmon National Forest.

Road Salt Damage to Roadside Vegetation

At the request of the Bridgeport District Ranger, Toiyabe National Forest, an evaluation was conducted on the effects of highway deicing salt upon roadside vegetation. The affected trees, mostly Jeffrey pine, are located in the Walker River canyon. Many other trees exhibiting signs of salt damage are located along the eastern shore of Lake Tahoe. Foliage samples were taken at roadside and uphill, at least 100 meters, from the road. The brown and green portion of each needle were cut apart and submitted as separate samples for analysis. Needles from control trees were submitted whole. The following table presents the results of these analyses. All results are in parts per million (ppm) of total chloride.

Control		Damage – green portion of needles		Damage – brown portion of needles	
Sample no.	ppm cl	Sample no.	ppm cl	Sample no.	ppm cl
3	110	2	4268	2	11802
5	123	3	4390	3	12695
6	118	4	4800	4	11904
		5	4480	5	12180
		6	5118	6	12135

Table 3. Results of sampling for chloride (C_1) in control, damaged green, and damaged brown needles from an area believed to be affected by road salting.

Another analysis for sodium (Na) was made of the controls and brown portions of the needles. Results of the acid digestion analysis are in parts per million (ppm):

Control		Brown tips	
Sample no.	ppm Na	Sample no.	ppm Na
3	52	3	239
5	63	4	135
6	63	5	184
		6	258

A request for assistance was received from a BLM forester concerning dead and dying ponderosa pine in the vicinity of an oil well drill site in eastern Utah. Soil samples were analyzed for oil, grease and salt. No significant oil and grease were found. Analysis for salt was for total NaCl in parts per million (ppm):

Soil away from drill site		Soil from drill site	
Sample no.	ppm NaCl	Sample no.	ppm NaCl
1	65.57	6	14804.10
2	32.71	7	13336.90
3	362.52		
4	32.90		
5	263.34		
8	65.91		
9	32.88		
10	65.40		

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DISTRIBUTION OF MAJOR FOREST INSECT INFESTATIONS IN REGION 4*

1977

LEGEND

- *Mountain Pine Beetle*
- *Douglas-fir Beetle*
- *Engelmann Spruce Beetle*
- *Western Spruce Budworm*
- *Black Pine-Leaf Scale*
- *Ips Engraver Beetle*
- *Larch Casebearer*
- *Ponderosa Pine Needle Miner*

Based on aerial and ground surveys

STATE AND PRIVATE FORESTRY
FOREST SERVICE
U.S. DEPARTMENT OF AGRICULTURE

SCALE

miles

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*Recent reorganization has resulted in numerous boundary changes which are not shown on this map. In addition portions of several National Forests were not flown.

RELIEF MAP
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